MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 3, 2016/2017

DBM5018 – BUSINESS MATHEMATICS

(RS)

30 MAY 2017
9.00 A.M. – 11.00 A.M.
(2 Hours)

INSTRUCTIONS TO STUDENT

1. This Question paper consists of 3 pages with 5 questions, excluding cover page and appendix.

2. Attempt ALL **FIVE** questions.

3. Write all your answers in the Answer Booklet provided.

4. Key formulae are given in the Appendix.

Question 1

a. Simplify the expression $\frac{5}{2h}+\frac{3-4h}{6h}$ in the simplest form. (4 marks)

b. Given the function $f(x)=1+2x$ and $g(x)=\frac{x}{x-1}$, $x\neq 1$. Find

i. $gf(x)$. (2 marks)

ii. $gf(10)$. (2 marks)

c. Solve the inequality $-5x+6\geq -7(5x-6)-6x$. Represent your solution in number line and set notation. (4 marks)

d. The price of the solid wood cabinet has been marked up 12% of the cost and is being sold for RM896. What is the original price of the solid wood cabinet? (3 marks)

e. Find the equilibrium point if the supply and demand equations of a product are $p=61-\frac{7}{2}q$ and $p=64-4q$ respectively. (5 marks)

[TOTAL 20 MARKS]

Question 2

The Fairy-Tail Company wants to add belts and wallets to its product line. Each belt costs the company RM18 in profit, and each wallet costs RM12. Both belts and wallets require cutting and sewing. Belts require 2 hours of cutting time and 6 hours of sewing time. Wallets require 3 hours of cutting time and 3 hours of sewing time. If the cutting machine is available 12 hours a week and the sewing machine is available 18 hours per week.

a. From the above information, determine the objective function. (1 mark)

b. State the constraints obtained from the above information. (3 marks)

c. Construct the graph that satisfy all the constraints. (8 marks)

d. Hence, what is the amount of belts and wallets respectively that will produce the most profit within the constraints? (7 marks)

e. From graph, find the number of wallet if the number of belts is 2. (1 mark)

[TOTAL 20 MARKS]

Continued...

Question 3

a. What is the interest earned on RM660 invested 36 months at a 5% simple interest? (3 marks)

b. Brooke makes an investment of RM840 in an account that pays 6% interest compounded monthly for 4 years.

i. How much does Brooke earned after 4 years? (4 marks)
ii. What is the amount of interest earned by Brooke? (1 mark)

c. Xanxus invest RM500 every month for 5 years in an account that pays interest 6% compounded semiannually.

i. What is the future value of annuity after 5 years? (5 marks)
ii. What is the amount of interest earned within this 5 years? (2 marks)

d. Leo needs to save RM25000 for a down payment to start a photo restoration business. What is the amount that he needs to save per month in an account that pays interest rate of 8% compounded quarterly for 6 years? (5 marks)

[TOTAL 20 MARKS]

Question 4

a. Differentiate the following functions:

i. $y = (1 - 3x^3)(x + 4)$ by using the Product Rule. (4 marks)

ii. $y = \dfrac{3x - 5}{4 - 5x}$ by using the Quotient Rule. (4 marks)

iii. $f(x) = \dfrac{4}{(2x - 3)^2}$ by using Chain Rule. (4 marks)

b. Find $\dfrac{dy}{dx}$ and $\dfrac{d^2y}{dx^2}$ for the function $y = \dfrac{1}{5}x^5 - 4x^3 + e^x - \ln 9 + 2x^2 + \dfrac{x}{3}$. (5 marks)

c. Given that the revenue function of *GOKU* company is $r = q(44 - 0.2q)$, where q is the number of units.

i. Find the marginal revenue function. (2 marks)
ii. Hence, calculate marginal revenue when $q = 15$. (1 mark)

[TOTAL 20 MARKS]

Continued...

Question 5

a. Evaluate each of the following integrals:

i. $\int\left(4x^3+\frac{2}{x^2}-e^x+5\right)dx$. (3 marks)

ii. $\int_1^2(2x+3)^4\,dx$. (7 marks)

b. Given that $\int_1^2 f(x)\,dx=3$ and $\int_1^2 g(x)\,dx=7$, find the value of

i. $\int_1^2[f(x)-2g(x)]\,dx$. (2 marks)

ii. n if $\int_1^2[3f(x)+n\,g(x)]\,dx=2$. (3 marks)

c. A *MERRY-GO* manufacturer's marginal cost function is $\frac{dC}{dq}=(q+10)(q+20)$, where q is the number of units.

i. Determine the cost function, $C(q)$. (3 marks)

ii. Find the cost from 12 to 45 units. (2 marks)

[TOTAL 20 MARKS]

End of Page.

APPENDIX:

Mathematics of Finance

Simple Interest	Future Value
$I = Prn$	$FV = PV(1+r)^n$
Present Value of Annuity	**Future Value of Annuity**
$A = R\left[\frac{1-(1+r)^{-n}}{r}\right]$	$S = R\left[\frac{(1+r)^n-1}{r}\right]$

Derivative

Power Rule	Product Rule
$\frac{d}{dx}(x^n) = nx^{n-1}$	$\frac{dy}{dx} = u\frac{dv}{dx} + v\frac{du}{dx}$
Quotient Rule	**Chain Rule**
$\frac{dy}{dx} = \frac{v\frac{du}{dx} - u\frac{dv}{dx}}{v^2}$	$\frac{dy}{dx} = \frac{dy}{du} \times \frac{du}{dx}$
Logarithmic Functions	**Exponential Functions**
$\frac{d}{dx}(\ln x) = \frac{1}{x}$ $\frac{d}{dx}(\ln u) = \frac{1}{u} \cdot \frac{du}{dx}$	$\frac{d}{dx}(e^x) = e^x$ $\frac{d}{dx}(e^u) = e^u \cdot \frac{du}{dx}$

Integration

Indefinite integrals

1. $\int k\,dx = kx + c$
2. $\int x^n\,dx = \frac{x^{n+1}}{n+1} + c \quad , n \neq -1$
3. $\int e^x\,dx = e^x + c$
4. $\int \frac{1}{x}\,dx = \ln x + c$

Definite Integrals

$$A = \int_a^b [f(x) - g(x)]\,dx = f(b) - f(a)$$